$y=\boldsymbol{m}\,x+\boldsymbol{b}$ Start at point $(\mathbf{0},\boldsymbol{b})$ $m=\frac{Rise}{Run}$ $+m=\frac{+Rise}{Run}$ or $-m=\frac{-Rise}{Run}=\frac{Fall}{Run}$

1. *Equation* 1, *Equation* 2 $\begin{cases} y=-3x+5 \\ -2x+y=-10 \end{cases}$ (3, -4)

Plot the line using the y-intercept (0, y) and the slope, m.

$$y=\boldsymbol{m}\,x+\boldsymbol{b}$$
$$y=\mathbf{-3}\,x+\mathbf{5}$$

Explain: Start at (0, 5) the y-intercept, then use the slope to find the next point

$$m=-3=\frac{-3}{1}$$

go down by three and over by 1.

Substitution Method

Substitute Equation 1 into Equation 2

Equation 1, *Equation* 2 $\begin{cases} y=-3x+5 \\ -2x+y=-10 \end{cases}$

$$-2x+(\mathbf{-3x+5})=-10$$
$$-5x+5=-10 \quad \text{simplify \& then solve}$$
$$-5x=-15$$
$$x=3$$

Substitute this value x=3 into equation 1

$$y=-3\cdot(3)+5$$
$$y=-9+5$$
$$y=-4$$
$$(\mathbf{3,-4})$$

is the solution to both equations

Plot the line using the x-intercept (x, 0) & y-intercept (0, y)

$$A\,\boldsymbol{x}+B\,\boldsymbol{y}=C$$
$$\mathbf{-2x+y=-10}$$

Explain: Use the y-intercept, (0, y) substitute the x=0 in equation 2.

$$\mathbf{2\cdot 0}+y=-10$$

Two times zero is zero!, Therefore..

$$y=-10$$

and the y-intercept is $(\mathbf{0,-10})$.

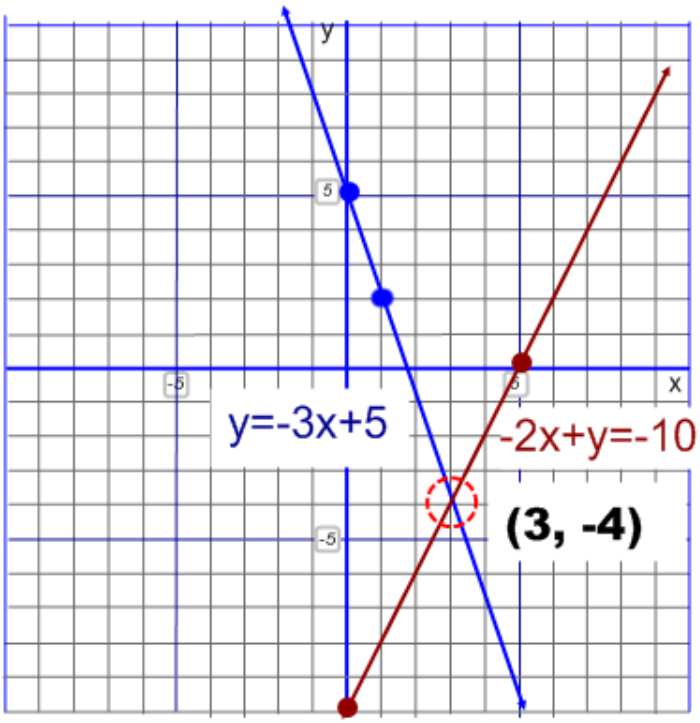
Now use the x-intercept, (x, 0)

$$\mathbf{-2x+y=-10}$$

substitute the y=0 in equation 2.

$$2x+\mathbf{0}=-10$$
$$-2x=-10$$
$$x=5$$

and the x-intercept is $(\mathbf{5,0})$.



$$\begin{array}{ll} \textit{Equation 1} & \left\{ \begin{array}{c} y=-3x+5 \\ -2x+y=-10 \end{array} \right. \\ \textit{Equation 2} & \end{array}$$

Elimination Method

Both equations must be in the Standard Form: $Ax+By=C$

Rewrite Equation #1

$$\begin{array}{r} y=-3x+5 \\ \underline{+3x \quad +3x} \\ 3x+y=5 \end{array}$$

$$\begin{array}{ll} \textit{Equation 1} & \left\{ \begin{array}{c} 3x+y=5 \\ -2x+y=-10 \end{array} \right. \\ \textit{Equation 2} & \end{array}$$ Which variable has the same coefficient? "**y**" has a coefficient of 1.

To eliminate it we need to subtract.

$$\begin{array}{r} 3x+y=5 \\ -(\underline{-2x+y=-10}) \end{array}$$ We can visualize this as 3 subtractions $$\begin{array}{rcl} 3x & \mathbf{+y} & 5 \\ -(\underline{-2x}) & \mathbf{-(+y)} & -(\underline{-10}) \end{array}$$ =

$$5x=15$$

$$\frac{5x}{5}=\frac{15}{5}$$

$x=3$ **Substitute this value into any of the equations**

$$\begin{array}{c} y=-3x+5 \\ y=-3(3)+5 \\ y=-4 \end{array} \quad \textbf{or} \quad \begin{array}{c} 3x+y=5 \\ 3(3)+y=5 \\ 9+y=5 \\ \underline{-9 \quad -9} \\ y=-4 \end{array} \quad \textbf{or} \quad \begin{array}{c} -2x+y=-10 \\ -2(3)+y=-10 \\ -6+y=-10 \\ \underline{+6 \quad +6} \\ y=-4 \end{array}$$

It doesn't matter which one you substitute into because you will end up with the same answer.

$(3,-4)$ **Is the solution to the system of equations**